P100 User Manual

Part 1 – Installation and Operation

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Description

The P100 is a sound generator module designed for use in many types of R/C models. The system can hold and replay 11 sounds in total:

- An Engine Start Sound
- An Engine Run Sound
- An Engine Stop Sound
- Eight General Sounds

As supplied, there is a set of sounds (or 'sound set') already programmed into the unit; this is selected at the time of purchase.

If you are happy with the sounds programmed onto your unit then you do not need a computer in order to operate your P100 successfully!

For those who *do* wish to expand their P100, a PC-based utility program on CD-ROM is also available for the unit. This utility allows the user to select and program sounds for the system via a USB link to the computer. It also allows the playback speeds for all of the sounds to be set up or changed as required.

When the unit is controlled from a radio control channel it can be operated in one of two modes. *The Mode is pre-selected when the unit is first programmed at the factory – again, as required by the purchaser - and can only be changed over from one mode to the other via the special software.*

- **Throttle Mode:** The P100 is plugged into the motor speed control channel and this controls the speed of the engine sound. The other sounds can be triggered by a suitable R/C switcher(s) working from another channel, or by another means of making a contact e.g. a push-button or micro-switch. When a "general" sound is played, the engine sound stops for the duration of that sound; it resumes once the sound has finished.

- **Switcher Mode:** The P100 is plugged into a spare proportional channel on the receiver. The radio control input allows the user to select any of the eight general sounds and operate it via the transmitter stick by "blipping" it (see later). *The engine sounds are not available in Switcher mode.*

The unit is designed to be an economic and reliable unit for the modeller who requires a general purpose unit. It has been optimised for simplicity, reliability and ease of installation.

Specification

Sound Output:	1vpk, 700mVRMS
Output Terminals:	Screw terminals for up to 1mm^2 wire
Short Circuit Time:	Infinite without damage
Amp, Impedance:	>10KΩ preferred
Sample Rate:	8,000 Samples per second default Variable up to 16,000 Playback above 16,000 samples per second achieved by skipping alternate samples
Sample Memory:	384K
Maximum Play Time:	49 Seconds at 8,000 SPS
Maximum Sound Size:	128K
Sound Play Size:	16.4 Seconds at 8,000 SPS
Supply Voltage:	4V to 6.2V[1]
Power Source:	From PC via USB socket Receiver Power
Maximum Current:	Typically 100mA

[1] Operation from a 5 cell receiver pack is not recommended. Use either a 4 cell receiver pack or a 5V BEC.

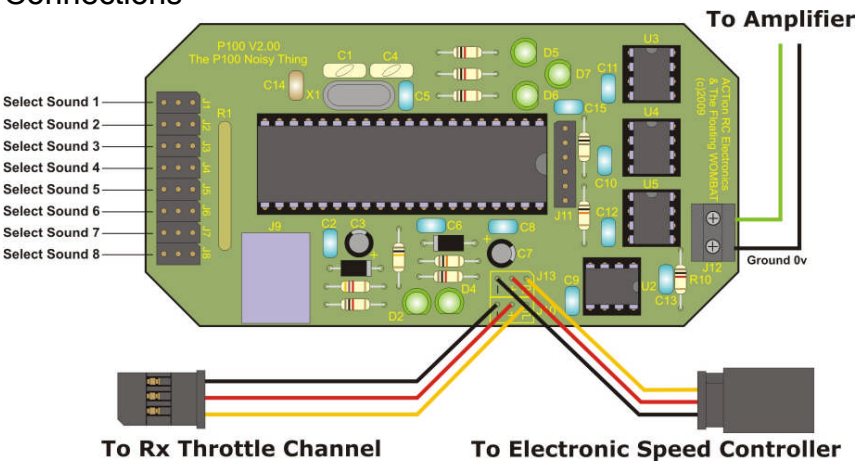
Installation

Positioning the unit

The P100 sound generator should be assembled into the ABS box provided. You will need to cut holes in the box to gain access to the connections. The exact size and position of these holes is your decision. If required, you can drill holes in the top of the box to allow you to monitor the LEDs, but this is not essential for the operation of the system. If you don't provide a cut-out in the case for the USB connector, you will have to remove the PCB from the case to program it. The P100 is sensitive to static electricity; we suggest laying the unit on a sheet of cardboard or wood if you work on it outside of its case. **DON'T USE A METAL SURFACE – YOU WILL SHORT OUT THE CONNECTIONS ON THE BACK OF THE CIRCUIT BOARD AND DESTROY THE UNIT!!**

The unit can be positioned in any orientation in the model. However, if there is any likelihood of water accumulating in the model, we strongly recommend that the P100 is placed away from where the water collects. We also recommend using self-adhesive "Velcro" to fix the case to the model. Don't use any kind of foam packing inside the case as it can attract moisture.

Connections



The connections for the P100 are shown above.

Connection to the Receiver

The P100 is connected to the receiver using the servo-type plug lead. If the unit is being operated in Switcher Mode, connect this directly to the receiver on the channel to be used for the control. This is typically a spare receiver proportional channel operated by one of the transmitter sticks. The other lead (with a socket) is not used in switcher mode.

If the unit is being operated in Throttle Mode, it is necessary to connect the P100 into the same channel as the electronic speed controller for the motor (or the speed control/throttle servo, for mechanical types). The P100 provides a "daisy-chain" connection for the speed controller. Plug the speed controller lead into the fly-lead on the P100 which is fitted with a female socket shell.

Note that the P100 is powered via its connection to the receiver. Many modellers use a Battery Eliminator to supply power to the receiver from the main motor battery. However, if the installation has a separate receiver pack the extra load of the P100 should be taken into account when considering the likely run time of the model. We recommend NiMH cells of at least 1600maH capacity for Rx packs.

Connection Without a Receiver

If the unit is being operated *without* a direct connection to a receiver, the P100 should be driven from a 4.8V receiver-type battery or via a 5V regulator such as fitted to ACTion P19 and P92.

THE P100 MUST NEVER BE OPERATED ON A VOLTAGE HIGHER THAN 6.2V AS THIS WILL RESULT IN DAMAGE TO THE UNIT.

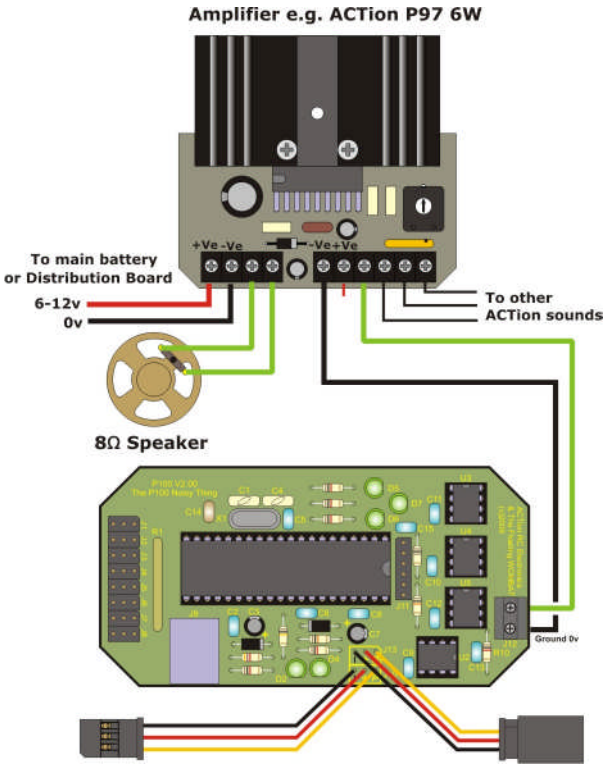
Connection to the Amplifier

The P100 requires a separate audio amplifier i.e. it can't be used by simply connecting it directly to a speaker. The P100 is connected to the amplifier using terminal block marked J12. This is a 2-way screw terminal connector. A suitable stranded wire between 7/0.2 (0.25mm^2) and 24/0.2 (0.75mm^2) should be used. If the wire used is too thin, it will be difficult to get a reliable connection. Do not over-tighten the screws or you may damage the connector block; finger-tight with the screwdriver is sufficient.

It is not necessary to use a screened cable to the amplifier as long as the connection is routed away from the motor and receiver connections. If you *do* use screened cable, connect the screening to the 0v terminal and the centre conductor of the cable to the output terminal of the P100.

With the P100 positioned as shown in the diagram below, the amplifier output is the upper connection on the screw terminal block. The other connection is 0v (ground). If these connections are reversed, the P100 will not be damaged but there will be no audio produced.

Connect the P100 amplifier output (shown in Green below) to the audio input on the amplifier. If an ACTion P34, P97 or P101 is being used, this connection goes to either the A, B, C or D terminals. If the receiver is running from its own separate battery pack, connect the ground terminal on the P100 (shown in Black) to the 'Power Out **-VE'** terminal on the amplifier.

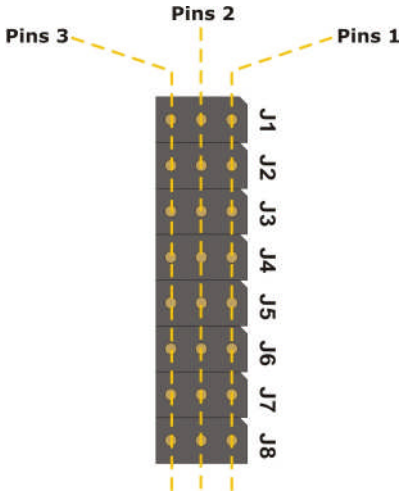


☹ **WARNING - DO NOT CONNECT THE P100 TO THE 'POWER OUT +VE' CONNECTION ON THE P34/P97/P101. THIS WILL RESULT IN DESTRUCTION OF THE P100.**

Connection To The Sound Selection Inputs

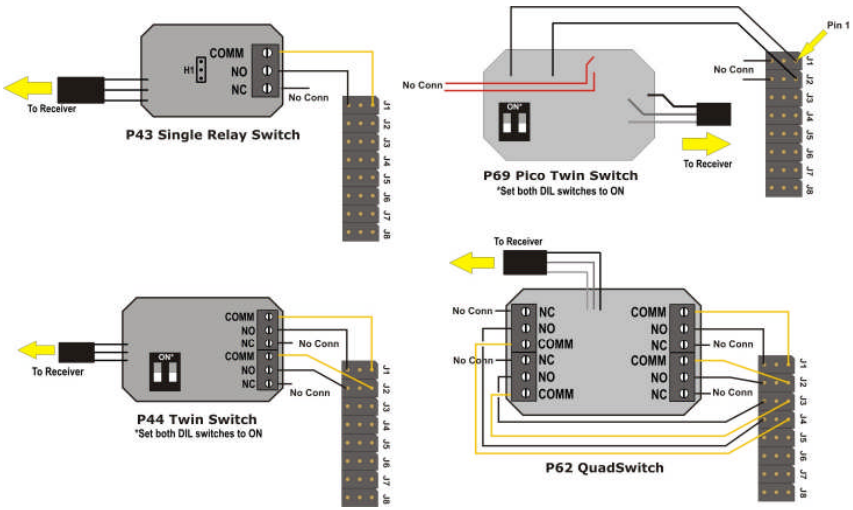
When the unit is being operated in throttle mode, the 8 general sounds are controlled using the 3-pin blocks J1 to J8. J1 controls Sound 1, J2 controls Sound 2, and so on. The sound is played by shorting Pin 1 on the connector to Pin 3 (Gnd/Battery negative).

- Pin 1 = Sound selection Input
- Pin 2 = +5V (*Do Not Connect*)
- Pin 3 = Ground (Battery negative -VE)



If the sound is being operated from the relay contacts of a switcher unit such as the P43, connect the outer pins (pins 1 and 3) on the appropriate header connector (J1-J8) of the P100 to the NO and COM outputs on the switcher. When the switcher control is activated on the transmitter, the sound will play.

If using a switcher with a transistor output such as the P69 Pico Twin Switch, connect Pin 1 (next to the diagonal corner on the board legend) on the connector of the P100 to the black wire on the P69. As long as the two units share a common ground, it is not necessary to connect anything to Pin 3 or to the two Red wires from P69. NB *Do* insulate the bare ends of the Red wires on P69!



The connections to various ACTion switchers are shown above.

The simplest way of connecting a switcher to the P100 is to use servo leads. These are available from ACTion. Remove the centre lead from the plug shell (usually Red as shown below) .

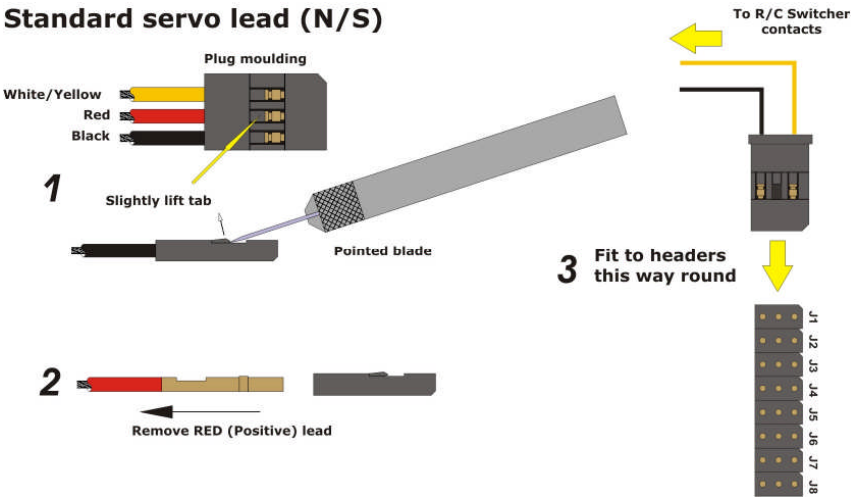
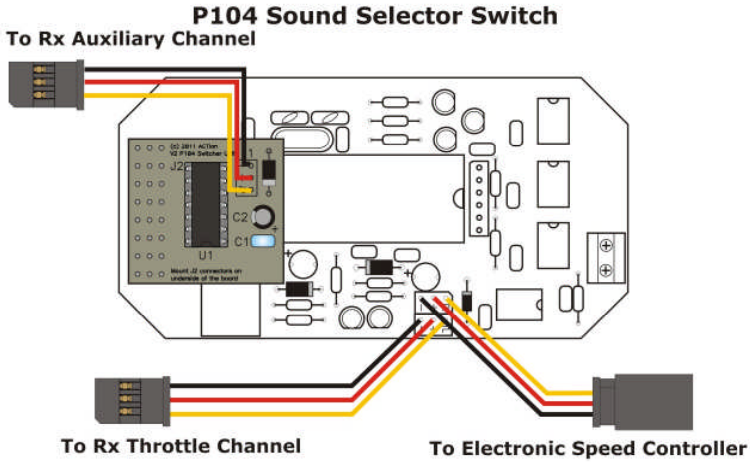


Diagram shows how to remove the Red wire from a standard servo-type lead and use it to connect a switcher to headers J1-J8.

P104 Sound Selector Switch

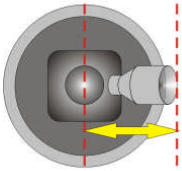


P104 Sound Selector Switch is just that – it allows the user to operate the P100 in its Throttle mode and to select and play up to eight "general" sounds via a second radio-control channel.

P104 is fitted simply by pushing it firmly onto the eight sets of 3-pins on P100. Connect the 3-wire ribbon cable to a spare channel on the receiver. This can be either a proportional channel (operated by a spring-centred stick; a 3-position switch or a rotary knob) or a 2-way switched channel e.g. "Retracts".

P104 is operated in a similar fashion to the P100 Switch Mode i.e. by "blipping" the transmitter lever or switch the appropriate number of times *BUT* P104's blips are all in the same direction and not four blips on each side of neutral (See Page 12). There are full instructions and illustrations supplied with each P104.

Sounds 1-8 - 'Blip' stick to full throw in one direction and release quickly



Sound 1 - Blip>Release (x1)
Sound 2 = Blip>Release>Blip>Release (x2)
Sound 3 =Blip>Release>Blip>Release>Blip>Release (x3)
Sound 4 =
Blip>Release>Blip>Release>Blip>Release>Blip>Release (x4)
Sound 5 =
Blip>Release>Blip>Release>Blip>Release>Blip>Release>Blip>
Release (x5) ETC

Operation Of The P100

The behaviour of the P100 depends on whether Throttle Mode or Switcher mode is in operation. *This selection can only be done via the software. 'Plug-and-play' units are supplied in Throttle Mode.*

Operation in Throttle Mode

In Throttle mode, the receiver output is used to control the speed of the engine sound. The general-purpose sounds are controlled from another R/C channel, if required, by the selection pins J1 to J8.

There are three sounds for the engine: a start sound, a run sound and a stop sound. These are played in the sequence: start, then run, then stop.

When the system starts up, none of the engine sounds are played. The unit will not start to play any engine sounds until it detects the throttle moving away from neutral. It will then play the engine start sound followed by the run sound. The run sound is played continuously. The speed of the run sound is set by the throttle position. NB A 'Start-up' sound will only be played if one is installed on the P100. *Some engine sound sets don't include a start (and/or stop) sound, as we don't have one available. If this is the case then the engine run sound will start immediately instead.*

While the unit is playing the engine run sound, it monitors the length of time the throttle is in the neutral position. If the throttle is left in neutral with the engine run sound playing for around 90 seconds the unit plays the engine stop sound and then stops all engine sounds – or just stops immediately if no 'Stop' sound sequence is installed. The engine sounds will start playing again when the throttle moves above the neutral position.

The best way to start the engine sound running is to blip the throttle briefly from neutral and then return the stick to the neutral position until the engine sound is idling steadily. If the throttle is not returned to neutral before the start sound has finished playing, there will be a sudden leap in the sound as the engine run sound ramps up to match the throttle position.

The General Sounds are played when the appropriate "select" input is made. The behaviour of the sound depends on whether it has been programmed to 'loop' or not. If the sound is not set to loop it will plays continuously *only* while the input is on. When the input is turned off, the General Sound finishes playing and the system will

return to the current engine sound (or silence, if the engine is not running).

The sounds are prioritised by number – the lower the number, the higher the priority of the sound. If a higher-numbered sound e.g. J4 is playing and a lower-numbered sound e.g. J2 is then selected, the lower-numbered sound will play immediately. If a lower-numbered sound is playing and a higher-numbered sound is then selected, the higher-number sound will not play until the lower-numbered sound has finished playing and is switched off.

If the sound is programmed to 'loop', it will start to play when the input is activated and will continue playing - even when the input is then switched off. The sound is stopped playing only by selecting a lower-numbered sound. For example if sound 5 is set to loop and is playing, sounds 6, 7 and 8 will not play until sound 5 has been stopped by playing sounds 1,2,3 or 4. *We suggest you read this again and play around with the unit to see what it will do. If all of the connections to the unit and switches mentioned previously are correct then you won't be in danger of breaking anything!*

Operation In Switcher Mode

In Switcher mode, the engine sounds are not played by the P100. They can be programmed into the unit, but will not be used until the unit is set to operate in throttle mode. The sound selection pins J1 – J8 are not used to select the General Sounds when the unit is in Switcher mode..

The unit is controlled from a spring-centred stick on the transmitter. The unit will **not** work in this mode from a spare channel which is controlled by a simple 2-way (On/Off) switch. To select the sounds the stick is "blipped" to the upper or lower limits of its travel. The sounds are selected as follows:

- Sound 1 – 1 "blip" to maximum
- Sound 2 – 2 "blips" to maximum
- Sound 3 – 3 "blips" to maximum
- Sound 4 – 4 "blips" to maximum
- Sound 5 – 1 "blip" to minimum
- Sound 6 – 2 "blips" to minimum
- Sound 7 – 3 "blips" to minimum
- Sound 8 – 4 "blips" to minimum

There is a knack to selecting the sounds, but it's only a matter of getting the timing right. Push the stick to the maximum (or minimum)

and immediately let it return to the centre. If more than one “blip” is required, pause slightly in neutral between the “blips” (typically about half a second). After about 1 second after the last blip, the sound will play.

Sounds 1-4 - ‘Blip’ stick to full throw in one direction and release quickly
Sound 1 - Blip>Release (x1)
Sound 2 = Blip>Release>Blip>Release (x2)
Sound 3 =Blip>Release>Blip>Release>Blip>Release (x3)
Sound 4 =
Blip>Release>Blip>Release>Blip>Release>Blip>Release (x4)
Transmitter Stick
Sound 5 - Blip>Release (x1)
Sound 6 = Blip>Release>Blip>Release (x2)
Sound 7 =Blip>Release>Blip>Release>Blip>Release (x3)
Sound 8 =
Blip>Release>Blip>Release>Blip>Release>Blip>Release (x4)
Sounds 5-8 - ‘Blip’ stick to full throw in other direction and release quickly

As when in Throttle mode, the sounds are prioritised by number – you cannot select a higher-number sound while a lower numbered one is playing. The lower-numbered sounds will override the higher numbered ones if selected. If a sound is programmed to be looped, it can only be stopped from playing by selecting a lower-numbered sound. For this reason, sound 1 cannot be looped.

Operating LEDs

The P100 has five LEDs which indicate the status of the unit:

D2: Indicates that a *USB connection* has been detected and the unit can power itself from the USB port

D4: Indicates that *Receiver power* has been detected and the Unit can power itself from the Receiver supply.

If both D2 and D4 are illuminated, the unit will power from whichever is producing the greatest voltage.

D5: *Reset/USB activity*. When the unit first powers up, D5 will flash rapidly for about 1 second as the unit resets. If D5 starts flashing rapidly under normal operation in a model, it indicates that the receiver power is too low to operate the P100.

When the system is connected to a computer via the USB, connection, D5 illuminates to indicate communication activity over the USB link.

D6: *Receiver Activity*. When this LED is flashing, the P100 has detected a valid signal from the connected Receiver.

D7: *Sound Playing*. If illuminated, the P100 is playing a sound.

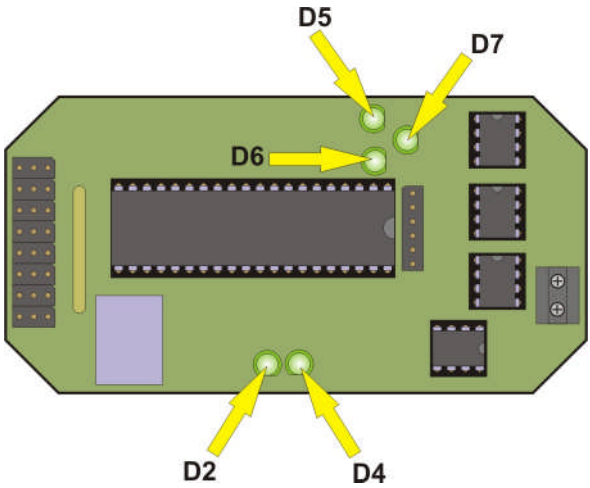


Diagram shows position of the five LED indicators

Software Installation

(This section details the installation of the software used to setup the P100 system, and is included only on the CD-ROM which is supplied as an accessory for those users who wish to program their own unit.)

You do not need a computer to operate the P100, but you will not be able to update the sound setup of your unit yourself without one.

If you do not wish to use the software you will be limited to the sound setup which is programmed in the unit when you purchase it, or you will have to return the unit to ACTion for reprogramming. This will incur a charge.